

WHAT IS CLAIMED IS:

1 1. A network system for carrying out communication between a
2 control station and a plurality of devices connected to a network, wherein
3 such communication includes data communication which requires real-
4 time attributes and message communication which does not require real-
5 time attributes, and wherein the data communication includes a first data
6 communication in which data is transmitted from the control station to
7 the devices and data in response to this transmission is transmitted from
8 the devices to the control station, and a second data communication in
9 which data is transmitted from the control station at a prescribed timing,
10 comprising:

11 a plurality of transmission queues for temporarily storing
12 transmission data provided in the control station, wherein one of the
13 queues holds transmission data for the second communication;

14 wherein after the first data communication is carried out in
15 accordance with a predetermined cycle time, an appropriate switching
16 between the message communication and the second communication is
17 carried out in the remaining time of the cycle time to complete one cycle,
18 whereafter the cycle is repeatedly carried out.

19 2. A network system for carrying out communication between a
20 control station and a plurality of devices connected to a network, wherein
21 such communication includes data communication which requires real-
22 time attributes and message communication which does not require real-
23 time attributes, comprising:

24 a function provided in the control station for independently
25 establishing a cycle time for communication;

26 wherein the established cycle time is referenced at each
27 communication cycle to determine the current cycle time; and

28 wherein after the data communication is carried out, the message
29 communication is carried out in the remaining time of the established
30 cycle time to complete one cycle, whereafter the cycle is repeatedly
31 carried out.

32 3. A control station for use in a network system for carrying out
33 communication between the control station and a plurality of devices
34 connected to a network, wherein such communication includes data
35 communication which requires real-time attributes and message
36 communication which does not require real-time attributes, and wherein
37 the data communication includes a first data communication in which
38 data is transmitted from the control station to the devices and data in
39 response to this transmission is transmitted from the devices to the
40 control station, and a second data communication in which data is
41 transmitted from the control station at a prescribed timing, comprising:

42 a plurality of transmission queues for temporarily storing
43 transmission data, wherein one of the queues holds transmission data for
44 the second communication; and

45 control means for extracting appropriate data from the plurality of
46 transmission queues;

47 wherein after the first data communication is carried out in
48 accordance with a predetermined cycle time, the control means carries
49 out an appropriate switching between the message communication and
50 the second communication in the remaining time of the cycle time to
51 complete one cycle, whereafter the cycle is repeatedly carried out.

52 4. The control station of Claim 3, further comprising:
53 a function for independently establishing the cycle time; and

a function for establishing the current cycle time by making reference to the independently established cycle time at each communication cycle.

5. A control station for use in a network system for carrying out communication between the control station and a plurality of devices connected to a network, wherein such communication includes data communication which requires real-time attributes and message communication which does not require real-time attributes, comprising:

a function for independently establishing a cycle time;

means for determining the current cycle time by making reference to the independently established cycle time at each communication cycle, wherein after the data communication is carried out, the message communication is carried out in the remaining time of the cycle time to complete one cycle; and

means for repeatedly carrying out the cycle.

6. A network system for carrying out data communication which requires real-time attributes and message communication which does not require real-time attributes, comprising:

a control station and a plurality of devices connected to a network;

wherein the control station includes a function to independently establish the total volume of message data transmitted in the next cycle during communication; and

wherein the devices carry out communication in manner that does not exceed the total volume of message communication established by the control station at each communication cycle.

7. A control station for use in a network system for carrying out communication between the control station and a plurality of devices connected to a network, wherein such communication includes data

82 communication which requires real-time attributes and message
83 communication which does not require real-time attributes, comprising:
84 a function to independently establish the total volume of message
85 data transmitted in the next cycle during communication; and
86 control means which carries out a control process to ensure the
87 devices carry out communication in manner that does not exceed the total
88 volume of message communication established by the control station at
89 each communication cycle.

90 8. A device for use in a network system for carrying out
91 communication between a control station and a plurality of devices
92 connected to a network, comprising:
93 a plurality of transmission queues for temporarily storing
94 transmission data;
95 means for storing transmission data in the plurality of transmission
96 queues;
97 control means for extracting appropriate data from the plurality of
98 transmission queues; and
99 transmission means for transmitting transmission data extracted by
100 the control means;
101 wherein at least one of the transmission queues holds transmission
102 data requiring priority transmission.